The Formation of Asteroidal Satellites in Large Cratering Collisions

D. D. Durda and P. E. Geissler (LPL, U. Arizona)

Numerical models have demonstrated that asteroidal satellites may be formed from the debris of a catastrophic collision between two asteroids (Durda 1996, *Icarus* **120**, 212-219). Another possible mechanism for forming small satellites about asteroids is through the mutual reaccretion of ejecta from large cratering impacts on the primary. In the absence of collisions or other perturbing forces, a particle ejected from the surface of a rapidly rotating, irregularly shaped asteroid will eventually re-impact the primary if it does not escape the system altogether. A small satellite cannot then be formed simply by launching a large ejecta block directly into orbit. However, numerical integrations of the trajectories of impact ejecta around 243 Ida (Geissler *et al.* 1996, *Icarus* **120**, 140-157) show that many debris particles can temporarily co-exist in complex orbits about the primary, offering the possibility that a fraction of the crater ejecta might collide and mutually reaccrete in orbit. For instance, only about 3% of the ejecta from a 10 km diameter crater on Ida would need to reaccrete to form Dactyl. We present numerical experiments from the same model we used to examine ejecta reaccretion on Ida, modified to include particle collisions and reaccretion in orbit, that explore the formation of small satellites from the impact ejecta mechanism.

Abstract submitted for 1996 DPS meeting

Date submitted: LPI electronic form version 5/96

Division for Planetary Sciences Abstract Form

DPS Category 10 Running #7408 Session 0.00

Invited ☐ Poster presentation ☒ Title only ☐

Have you received your Ph.D. since the last DPS meeting?

Yes ☐ No ☐

Is your abstract newsworthy, and if so, would you be willing to prepare a news release and be available for interviews with reporters?

Yes ☐ No ☐ Maybe ☒

Paper presented by Daniel D. Durda
Lunar and Planetary Laboratory
University of Arizona

Tucson AZ 85721 USA
Phone: (520) 621-1725
Fax: (520) 621-5133
Email: durda@pirl.lpl.arizona.edu

Special instructions: Tue Aug 27 15:40:27 CDT 1996

Membership Status (First Author):

DPS-AAS Member ☒ Non-Member ☐

Student Member ☐ Student Non-Member ☐

Is this your first DPS presentation? Yes ☐ No ☐

Sponsor: